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(19)



(54) BUILDING BLOCK

(71) We, WEXHAM DEVELOPMENTS LIMITED a Company organised under the laws of Great Britain, of Wexham Springs, Slough, Berks, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a method of making a building block for constructional purposes.

In the burning of pulverised fuel in industrial furnaces, generally power-station furnaces, a form of fine ash is produced which is carried along in the exhaust gases from the furnace and extracted and is known as pulverised fuel ash. Coarser particles of ash formed in the furnace settle to the bottom of the furnace and are withdrawn as furnace bottom ash. These two forms of ash may not be chemically identical but in general they are of similar type apart from their different particle size ranges. They are composed largely of compounds of silica, alumina, and iron oxide with calcium and magnesium and some sulphate.

In a typical particle size distribution pulverised fuel ash has a particle size of not more than 0.6 millimetres (600 microns).

It is an object of the invention to utilise ash of this type in the making of constructional building blocks.

According to the present invention a method of producing a building block comprises pelletising pulverised fuel ash with Portland cement and forming the resultant pellets into a block. The block may be formed in a mould and subsequently allowed to cure. In this connection pelletising refers to the production of pellets from a particulate material by rolling the material on an inclined rotating surface such as a dish or drum with application of water as pelletising agent.

The Portland cement is included in the pelletising mixture preferably in an amount such that the ratio by weight on a dry basis of the Portland cement to the rest of the material to be pelletised is from 1 : 4 to 1 : 20, most preferably 1 : 8. Furnace bottom ash may advantageously be incorporated with the pulverised fuel ash for instance in a ratio of pulverised fuel to ash to furnace bottom ash of 3 : 1. A preferred material to be pelletised comprises by weight 6 parts of pulverised fuel ash, 2 parts of furnace bottom ash and 1 part of Portland cement.

The materials to be pelletised should first be mixed well together in the dry state, preferably on a continuous basis, after air-drying if necessary. Any lumps present should first be broken up, but the normal particle size of the ash and of the cement is suitable without further reduction, for pelletising to form the composite material of the present invention. The ash material can be conveniently pumped in from the power station if the invention is performed in its vicinity.

Pelletising may be performed in the conventional manner involving rolling on a rotating surface, such as in a pelletising drum or on a pelletising dish, selected and adjusted in known manner to yield a product of the desired size grading. Other material may be incorporated if desired, to assist in nucleation or air-entrainment; such material may be subsequently removable, for instance by change of state, e.g., into liquid, and leaching.

Water added during pelletising should be that needed for effective pelletising for instance leading to pellets produced with a moisture content of from 10 to 20 per cent by weight on a dry basis.

After pelletising the product may be screened if desired but this is not normally necessary. The preferred pellet diameter is in the range from 5 mm to 15 mm inclusive.

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The pellets may be formed into a block by charging them in the uncured state into a mould, vibrating the mould sufficiently to settle the pellets into a coherent block of pellets, removing the block from the mould and allowing the block to cure. Curing may be brought about by standing in a suitable atmosphere to prevent moisture loss and hydrate the cement, i.e., a moist atmosphere, or by applying steam.

In a preferred method an open-topped mould charged with pellets is loaded with a predetermined surcharge of the pellets, i.e., is over-filled, and the vibration is performed until the total quantity of pellets settles so as to just fill the mould. The predetermined surcharge is readily ascertained by experiment, having regard to the bulk density desired in the block produced. In general vibration is terminated as soon as the block is capable of being released from the mould by virtue of its coherence.

Blocks can be produced by the method of the invention satisfying the strength and dimensional requirements of British Standard specification 2028 and having a bulk density of less than 1200 Kg/m³.

The following Example is given for the purpose of illustrating the invention.

Example

6 parts of pulverised fuel ash, 2 parts of furnace bottom ash and 1 part of ordinary Portland cement were weighed from respective hoppers into a mixing system and thoroughly mixed in the dry state. The mixture produced was fed to a dish pelletiser and pelletised with the addition of water to yield pellets having a moisture content of about 18 per cent, of a size range from 5 mm to 15 mm, mainly about 10 mm. Open-topped rectangular moulds were immediately filled with these pellets so that a surcharge of about 15 per-cent by volume was present. The moulds were then vibrated for half a minute to obtain a block of the required size and the moulds were then stripped from the blocks which had formed within them. The resulting blocks complied with the above-mentioned requirements after steam-curing and being allowed to dry.

WHAT WE CLAIM IS:-

1. A method of producing a building block which comprises pelletising pulverised fuel ash with Portland cement, and forming the resulting pellets into a block.

2. A method according to Claim 1, wherein furnace bottom ash is incorporated with the pulverised fuel ash.

3. A method according to Claim 2, wherein the ratio by weight of pulverised fuel ash to furnace bottom ash is 3 : 1.

4. A method according to any of Claims 1 to 3, wherein the ratio by weight on a dry basis of the Portland cement to the rest of

the material to be pelletised is from 1 : 4 to 1 : 20.

5. A method according to claim 4, wherein the material to be pelletised comprises by weight 6 parts of pulverised fuel ash, 2 parts of furnace bottom ash and 1 part of Portland cement.

6. A method according to any preceding claim wherein the particle size of the pulverised fuel ash is not more than 0.6 millimetres.

7. A method according to any preceding Claim wherein the pellets are produced with a moisture content of from 10 to 20 per cent by weight on a dry basis.

8. A method according to any preceding Claim, wherein the pellet diameter is in the range from 5 mm to 15 mm inclusive.

9. A method according to any preceding Claim wherein the pellets are formed into a block by charging them in the uncured state into a mould, vibrating the mould sufficiently to settle the pellets into a coherent block of pellets, removing the block from the mould and allowing the block to cure.

10. A method according to Claim 9, wherein a charged open-topped mould is loaded with a predetermined surcharge of the pellets and the vibration is performed until the block of the required size is formed.

11. A method according to Claim 9 or 10, wherein the block is cured by standing in a moist atmosphere or by applying steam.

12. A method of producing a building block substantially as described with reference to the Example.

13. A building block produced by the method of any preceding Claim.

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